National Measurement Office

UK/0126/0014

MI-005

# EC type-examination certificate UK/0126/0014 Revision 7

issued by:

**The National Measurement Office**

**Notified Body Number 0126**

In accordance with the requirements of the Measuring Instruments (Liquid Fuel delivered from Road Tankers) Regulations 2006 (SI 2006/1269) and the Measuring Instruments (Non-Prescribed Instruments) Regulations 2006 which implement, in the United Kingdom, Council Directive 2004/22/EC, this EC type-examination certificate has been issued to:

**Alpeco Ltd**
**66 - 68 Rabans Close**
**Aylesbury**
**Bucks, HP19 8RS**
**United Kingdom**

in respect of an interruptible measuring system for liquids other than water and having the characteristics described below.

| | |
|---|---|
| Model designation | Truck Metering System |
| Maximum rate of flow | 1100 litres / minute |
| Minimum rate of flow | 40 litres / minute |
| Maximum operating pressure | 10 bar |
| Minimum delivery | 150 litres pumped<br>1000 litres gravity |
| Liquids measured | Derv; Gas oil; Kerosene, Paraffin; Gasoline; Diesel; Domestic heating oils |

The necessary data (principal characteristics, alterations, securing, functioning etc) for identification purposes and conditions (when applicable) are set out in the descriptive annex to this certificate.

This Revision replaces previous versions of this certificate.

**Issue Date:** 28 April 2014
**Valid Until:** 27 September 2017
**Reference No:** T1121/0014

**Signatory:** G E Stones
**for** Chief Executive

UKAS PRODUCT CERTIFICATION
0135

National Measurement Office

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NMO is an Executive Agency of the Department for Business Innovation & Skills

# Descriptive Annex

## 1 INTRODUCTION

This pattern is a meter measuring system fitted to a road tanker for the transport and delivery of liquids with low viscosity and stored at atmospheric pressure.

It comprises a multi-compartment tank, an optional multi-compartment manifold pipe and valve system, a pump, an optional filter, a meter, gas separator and compatible ancillary equipment.

The system may be fitted with:

One full hose reel and one empty bulk hose system, which is cleared of product at the end of the delivery by a 'blow-down' system. Hydraulic system diagrams are shown in Figure 1 and Figure 2. A general view of a typical system is shown in Figure 8. The system allows:

(i) Metered delivery by pumping (full hose or empty hose)

(ii) Direct un-metered delivery (with or without pumping) and emptying and filling of the cargo tank, without passing through the meter.

Alternatively the system may be fitted with:

One empty hose reel system and an optional empty bulk hose system whereby both hoses are cleared of product at the end of the delivery by a blow-down system. The hydraulic system diagram is shown in Figure 3.

The system allows:

(i) Metered delivery by pumping (empty hose reel and or empty Bulk hose)

(ii) Direct un-metered delivery (with or without pumping) and emptying and filling of the cargo tank, without passing through the meter.

## 2 FUNCTIONAL DESCRIPTION

### 2.1 Mechanical

#### 2.1.1 Hydraulics

The hydraulics system diagrams illustrating the various options are shown in Figure 1. With reference to Figure 1, liquid may flow from any of the selected compartments of the cargo tank via the appropriate foot valve to the optional manifold. From there it passes through an optional 2-way valve, R1, which allows metered delivery, un-metered delivery and emptying and filling of the tank without passing through the meter. An outlet valve, Vm, on the downstream side of the optional pump permits un-metered pumped delivery. Metered deliveries pass through an optional filter F2, gas separator GS and meter C. Operating valves, Vm, select bulk or hose-reel delivery.

#### 2.1.2 Gas elimination devices

The system may be fitted with the following gas elimination devices.

##### 2.1.2.1 Gas extractor

This is a Liquid Controls gas extractor type A8100 as described in EEC certification No UK81 1783. A Liquid Controls filter unit is fitted directly to the gas extractor on its upstream side. Gas from the air extractor is vented directly to the cargo tank or Manifold system via a one-way valve, or optionally, to a liquid catchment tank. The catchment tank is fitted with a vent valve and a drain valve.

#### 2.1.2.2 Combined gas separator and pump

This is a Mouvex DMX gas separator as described in EEC Cert. No. F99.00.522002.0 combined with a Mouvex CC 8.50 vane pump (Figure 10). The unit also contains a filter, a flow regulator and a flow detector. A two-way valve selects bulk or measured deliveries. The unit will automatically change to low flow rate during closing of the nozzle and there is automatic pressure reduction during bulk discharge at high flow rate. Degassing occurs before filtering and pumping.

#### 2.1.2.3 Special Gas Extractor (Figures 20 & 21)

This is a LC Sound special gas extractor as described in NMi evaluation certificate TC7329.

### 2.1.3 Meters

The system may be fitted with one of the following meters.

| Manufacturer | Model designation | Reference |
|---|---|---|
| Liquid Controls | M-7 | EEC certification No UK06 2808 |
| Liquid Controls | M-15 | EEC certification No UK06 2808 |
| Liquid Controls | M-25 | EEC certification No UK06 2808 |

These meters are fitted with a pulse output device (Figure 7). Where bulk deliveries are un-metered, the 2-way valve shown in Figure 9 is not required.

## 2.2 Electronics

### 2.2.1 S.A.M.P.I s.p.a TE550 and TE550 – Truck III, electronic calculating / indicating device, NMI Evaluation Certificate TC7171 and NMO Evaluation Certificate GB-1522 respectively

The TE550 is a programmable electronic register, usable for applications for up to four meters with a pulse generator. The TE550 counts the number of pulses received from the pulse output device on the meter and uses a stored calibration value (pulse per litre) to calculate the metered volume of liquid. The equipment comprises of three main parts, The LKI display panel (Figure 6) the CPU module (Figure 5) and Epson TM-U295 slip printer (Figure 4).

The construction of the CPU module may vary according to where it is mounted on the vehicle, i.e. in the cab or externally mounted somewhere on or under the vehicle chassis. In either case the CPU module houses the following components and is secured by sealed wire (Figure 4) to prevent unauthorised access.

| | |
|---|---|
| CPU board | 320 220 1864 |
| CMOD board | 320 220 1862 |
| 24PS board | 320 220 1866 |
| I/O board. | 320 220 1867 |

The LK1 Display panel (S50050-) can be mounted anywhere on the vehicle as long as it is clearly visible and accessible to the user.

The Epson printer (TM-U295) is generally mounted independently in the cab.

The solenoid control box is chassis mounted.

## 3 TECHNICAL DATA

### 3.1 Metrological parameters

| | Meter | | | |
|---|---|---|---|---|
| | **M-25** | **M-15** | **M-7** | |
| Accuracy class | 0.5 | 0.5 | 0.5 | |
| Maximum rate of flow: | 1100 | 900 | 450 | litres / minute |
| Minimum rate of flow: | 110 | 90 | 45 | litres / minute |
| Maximum working pressure: | 10.5 | 10.5 | 10.5 | bar |
| Minimum delivery : | 150 | 150 | 150 | litres |
| Liquids measured: | Liquid petroleum products of low viscosity (<20 mPa·s) except LPG. | | | |
| Climatic environment: | -10 °C to +40 °C<br>Open, condensing | | | |
| Electromagnetic environment: | E3 | | | |
| Mechanical environment: | M2 (vehicle mounted) | | | |

Note: The maximum rate of flow, however, must not be greater than the maximum rate of flow of any component of the system.

### 3.2 Supporting documentation

MA_84 (and its revisions) - Installation, use and service manual
MA_64 (and its revisions) - Communication protocols
MA_223 (and its revisions)- Installation, use and service manual (Truck III)
MA_68 (And its revisions) - LC Sound Installation, Use and Service Manual
Wiring and installation diagrams - supplied by Alpeco
Operating instructions for the system – Supplied by Alpeco.

### 3.3 Software

The software version number for TE550 is CT-001-550-001-XX. (XX can be any number).
Alternative software version number is CT-001-550-002-XX. (XX can be any number).

The software version number for TE550 Truck III is XX-1-TRK-XX-XX-XX See OIML Evaluation cert GB-1522 and GB-1523 for explanation of code.

### 4.1 Interfaces

The instrument may have the following interfaces:

(i) Connection to an Epson TM295U dot matrix slip printer.
(ii) Electro-pneumatic interface to the manifold/footvalve pneumatic control system.
(iii) Electro-mechanical interface to the Product return and Checkmate anti cross- over system.

## 4.2 Peripheral devices

The instrument may be connected to any peripheral device that has been issued with a test certificate (evaluation certificate) by a Notified Body responsible for Annex B (MI-005) under Directive 2004/22/EC in any Member State and bears the CE marking of conformity to the relevant directives; or
A peripheral device without a test certificate may be connected under the following conditions:

- it bears the CE marking for conformity to the EMC Directive 89/336/EEC;
- it is not capable of transmitting any data or instruction into the measuring instrument, other than to release a printout, checking for correct data transmission or validation;
- it prints measurement results and other data as received from the measuring instrument without any modification or further processing; and
- it complies with the applicable requirements of Paragraph 8.1 of Annex I.

# 5 OPERATION

**See Alpeco Operation manual**

# 6 APPROVAL CONDITIONS

The certificate is issued subject to the following conditions:

**6.1** Legends and inscriptions

**6.1.1** The instrument bears the following legends:

Manufacturers mark or name
Accuracy class
Maximum operating pressure
Operating temperature range
Minimum delivery
Flow rate range
Serial number
Certificate number
'CE' marking
Supplementary metrology marking
Notified body identification number

# 7 LOCATION OF SEALS AND VERIFICATION MARKS

The following shall be sealed to prevent unauthorised adjustment or dismantling:

## 7.1 Pulse output device

The pulser is sealed along both sides as shown in Figure 9. The wire through the rear drilled bolt also prevents removal of the POD from the meter housing.

### 7.2 TE550

(i) CPU Module Figure 5 (This enclosure may vary depending on internal or external mounting in either case the enclosure should be sealed to prevent unauthorised access and tampering.) the printer is generally mounted in the vehicle cab.

(ii) LKI indicator enclosure housing the calibration switch as shown in Figure 6

### 7.3 A8100 Gas eliminator

At least one of the vent pipes from the gas extractor shall be protected, by seals if necessary, from being closed or obstructed in any way.

### 7.4 Gas separator/pump DMX

(i) Air pipe (signal to pump) via sealed copper compression fittings.

(ii) DMX unit to pump. Drilled flange bolts seal this.

(iii) Pump. The bypass pneumatic control is sealed by drilled fittings.

(iv) 2-way valve. Lead plugs seal the valve body.

### 7.5 Meters

The covers of the meter housing and the calibrating mechanism shall be sealed to prevent unauthorised adjustment or dismantling.

## 8 ALTERNATIVES

### 8.1 Alternative Enclosure for the LK1 Display panel (Figure 12)

Having the LK1 display panel mounted in an enclosure combined with the pneumatic controls. The calibration switch is found behind the cover shown in the inset of figure 12 and is sealed through predrilled screws in the case and the cover.

**8.1.1** Having the alternative enclosure for the LK1 display panel as described in 8.1, but with alternative sealing arrangement of the calibration switch. The 2 screws which retain the calibration access plate are sealed to an additional bolt; this makes it possible to remove the front facia panel without breaking a seal (Figure 15). This bolt also secures the back cover of the LK1 display panel and the calibration switch, (Figure 16), so when the facia panel is removed from the housing the calibration switch is protected.

### 8.2 Alternative TE550 CPU Module Casing (Figure 13)

The CPU components are housed in two plastic enclosures, with the main CPU boards in one and the interface connections in the second. The CPU board's enclosure is sealed by wire through the casing screws.

### 8.3 Connection of OutTrak iMeter, data monitoring device

The OutTrak iMeter box (Figure 14) may be connected between the electronic register and the printer. The OutTrak iMeter System is designed to obtain transaction data generated by the electronic register and then passed onto an onboard computer for invoicing purposes. The legal data is not affected and passes through the iMeter box to the printer and prints receipts as described in the certificate, the extra invoicing data is printed on the end of the legal receipt.

Further invoice information generated by the on board computer can be printed on the onboard printer via Port 2.

**Note:** This invoice information is not intended to replace the legal printed transaction data.

There are three serial ports on the iMeter box:

- Port 0 is the input port from the meter, this requires the purple cable.
- Port 1 is the output port from the box to the printer, use the white cable for this.
- Port 2 is the control port, this can either be connected directly to the on-board computer or to a Bluetooth adapter.

The software version loaded on to the iMeter box can be checked by a switch located in a small opening on the side of the box. Turn **ON** switch 3 and power up the iMeter, a message will then be sent to the printer with the version details. Once the information is printed, switch 3 is switched **OFF** and the iMeter box can be reset ready for use.

A message similar to the following will print on the meter printer:

OutTrak Software Services Ltd.

RS232 Multiplexer 3-Port

Electronic Meter Interface Module

Build Version 1.2.0

Operating Mode: A

The unit is sealed with tamper evident seals on two sides of the box and should be removed from the system if found to be damaged.

## 8.4 Optional Uplift System

The system may be fitted with an optional “UPLIFT” facility to allow loading of the tanker by pumping, via the meter. Systems equipped for uplift operations are fitted with an additional interlocked 2 way valve **Twv2** which facilitates connection of a suction hose to an external supply source in order that the tanker can self load via the tanker pump, meter and product return system.

When valve **Twv2** is switched to the “UPLIFT” position the Degassing function of the DMX gas separator **SgP** is deactivated and a Liquid Controls gas extractor type A8100 **GS**, fitted to the inlet side of the meter, evacuates any air which may be induced during the uplift process.

## 8.5 Temperature Compensation Activated on the TE550

### 8.5.1 Temperature probe installation

The temperature compensation probe is a PT100 resistance thermometer which can be fitted, either:

- into the liquid pipe work, by means of a socket welded at a convenient point midway between the pump and meter inlet, or
- for installations where the strainer and gas extractor A8100 are employed, the probe can be fitted to the thermowell socket which is incorporated into the strainer end cap.

In either case the retention method should be wire sealed in order to prevent unauthorised removal. Examples of the sealing are shown in Figures 17 and 18.

**8.5.2** Temperature Probe Calibration

The calibration of the PT100 is checked by measuring the minimum and maximum resistance of the probe @ $0^0$C and $100^0$ C respectively. The resistance values measured in ohm's are entered into the relevant windows when the register is entered into calibration mode. See section 6.6.3 in operators manual MA-84.

**8.5.3** Conditions of installation

**8.5.3.1** When set up for temperature correction the TE550 displays the Volume @ $15^0$C on screen.

**8.5.3.2** The delivery ticket will show the compensated volume and product temperature, (See below):

| | |
|---|---|
| NET VOL START | 0.0 (L) |
| NET VOL END | 123456.7 (L) |
| TEMPERATURE | 17.9 °C |
| VOLUME CORRECTED TO | 15°C |

## 8.6 NEW STYLE CPU HOUSING

The CPU housing, as shown in Figure 19, has been modified slightly to allow for additional PCB's which may be required for other applications, otherwise the internals are unchanged.

# 9 RECOMMENDED TESTS

**9.1** Ensure that a product return cannot take place unless a product designated DERV RET, GAS RET KERO RET or PRODUCT RET is selected when the Product return master switch is pulled out.

**9.2** Check that the delivery is terminated if the product return master switch is pulled during a normal delivery.

# 10 ILLUSTRATIONS

## 10.1 KEY TO HYDRAULIC DIAGRAMS

### 10.1.1 Key to Figure 1

| | |
|---|---|
| SgP | Gas separator combined with supply pump |
| R2 | Optional two way valve for direct un-metered delivery, un-metered delivery |
| R1 | Optional two way valve allowing metered delivery, un-metered delivery and emptying and filling of the tank without passing through the meter |
| MVV | Manifold vent valve. |
| P | Optional pump with auxiliary devices |
| F2 | Filter |
| GS | Gas separator with gas release |
| FV | Compartment foot valve |
| FC | Faucet valve |
| M | Optional manifold where this is fitted means are provided to prevent transfer of liquid between compartments by adequate foot valves, faucet valves, non-return valves or interlock mechanisms. |
| CI | Optional non-return valve |

| | |
|---|---|
| V3 | Sight glass serving as a gas indicator |
| R3 | Device allowing deliveries to be made by either of two available methods |
| Vm | Operating valve |
| V2 | Sight glass serving as a product indicator |
| FL1 | Full hose on reel |
| FL2 | Optional full on hose reel |
| PGS | Gas extractor |
| V4 | Sight glass of gas extractor |
| B | Optional bypass allowing metered gravity-feed delivery (empty hose). This bypass is authorised only if there is no valve r1 |
| A | Anti-swirl device |
| F | Filter/strainer |
| At | Optional air vent (blow down) |
| V1 | Weir type sight glass |
| T1 | Vessel to catch liquid particles entrained by the gases |
| T2 | Return to tank |
| T3 | Blow off valve |
| C | Meter |
| Cla | Valve preventing the full hose from emptying |
| Twv2 | Two way valve with interlock – Uplift connection.. |
| Est | External supply tank |
| Va | Valve automatically closed by the gas extractor when the pressure is insufficient to prevent vapourisation in the meter or when a gas pocket accumulates in the extractor. In addition, this valve must close in the event of a failure in its control system. Variants of the delivery device : I; II; III: |

I : one or two full hoses
II : one or 2 empty hoses
III : combinations of one full and one empty hose or one empty hose
IIII: Option of I, II OR III with uplift system

### 10.1.2 Key to figure 2

| | |
|---|---|
| At | Air Tank |
| Bd | Blowdown valve |
| Cb | Control Box |
| Nr1 | Non Return Valve |
| Nr2 | Non Return Valve |
| Ps1 | Pilot Operated Valve |
| Ps2 | Pilot Operated Valve |
| Ps3 | Pilot Operated Valve |
| Ps4 | Pilot Operated Valve |
| Tm | Timer |
| R1 | A two-way valve to deliver product with or without metering and to empty or fill the tank without passing through the counter. This optional valve can be replaced by a direct connection. The conduit linking the pump to the two-way valve controlling direct deliveries must have an internal volume no greater than 3 litres. |
| F | A filter incorporated in the DMX gas separator or standard filter |

| | |
|---|---|
| SgP | MOUVEX DMXIII combined gas separator and pump, approved by Cert. No. F99.00.522 003.0. |
| Pg | Gas Extractor as approved in EECUK81 1783 |
| cl1 | A non-return valve that can be mounted downstream of the meter. Optionally, this valve can also act as a flow detector (FD). |
| R2 | Type MF two-outlet valve SBL to allow direct delivery without metering. This valve is optional. If fitted, the "MF" variant of the DMX gas separator is required. |
| C | Meter. |
| I | Combination of one empty hosereel and one empty bulk hose. |
| II | One empty hosereel. |
| V² | Sightglass also serving as a gas indictor. |
| Vm | Operating valve, which can be pneumatically controlled; if pneumatic control is used, the operation of the valve can be slaved to that of the DMX separator. |
| R3 | A valve with two outlets in which the three orifices cannot be simultaneously connected together and which ensures the outlet used cannot be changed during metering. |
| cl² | Non-return valve. |
| fl1 | Empty hose reel |
| R | Two way valve to allow direct delivery unmetered on standard gas extractor system |
| Vft | Compartment Foot Valve |
| Vfc | Faucet Valve |
| M | Optional Manifold. Where this is fitted means are provided to prevent transfer of liquid between compartments by adequate foot valves, faucet valves, non return valves or interlock mechanisms. |
| T1 | Return to Tank |
| T2 | Catch Tank |
| V1 | Overflow sightglass |
| MVV | Manifold vent valve |
| X | Meter system X which incorporates Pg Gas extractor should not be installed in conjunction with Manifold M |
| Y | Meter system Y which incorporates SgP Gas separator can be installed in conjunction with either Faucet valve Vfc or Manifold M |

### 10.1.3 Key to figure 3

| | |
|---|---|
| **At** | Auxiliary air tank |
| **Bd** | Blowdown valve |
| **Cb** | Product return system control box |
| **Ms** | Master control switch |
| **Ps** | Pneumatic valve |
| **Pt** | Product transfer valve |
| **Pv** | Poppet valve |
| **Rc** | Rotary valve |

## 11 CERTIFICATE HISTORY

| ISSUE NO. | DATE | DESCRIPTION |
|---|---|---|
| UK/0126/0014 | 28 September 2007 | Type examination certificate first issued. |
| UK/0126/0014 Revision 1 | 23 June 2008 | Additions of sections 8.1 and 8.2, and figures 12 and 13<br>Section 2.3 amended (due to editorial error), the text:- *maximum of 5000 modified parameters*<br>is replaced by:- *maximum of 1000 modified parameters*<br>Section 3.3, alternative software version number is CT-001-550-002-XX. |
| UK/0126/0014 Revision 2 | 17 December 2008 | Addition of section 8.3 and Figure 14. |
| UK/0126/0014 Revision 3 | 2 June 2009 | Addition of section 8.1.1 and Figures 15 and 16.<br>Applicant's address changed. |
| UK/0126/0014 Revision 4 | 4 November 2009 | Addition of section 8.4 – Optional Uplift System.<br>Figure 1 and corresponding Key edited to include Optional Uplift System components.<br>Section 2.1.2 – editorial change "one of" deleted. |
| UK/0126/0014 Revision 5 | 06 December 2010 | Front page and section 3.1 – Reduction of minimum delivery to 150 litres (pumped)<br>Addition of section 8.5 – Temperature compensation<br>Addition of section 8.6 – Alternative CPU Enclosure.<br>Addition of Figures 17, 18 & 19 |
| UK/0126/0014 Revision 6 | 11 May 2011 | Addition of section 2.1.2.3 Special Gas Extractor**:-** LC Sound special gas extractor |
| UK/0126/0014 Revision 7 | 28 April 2014 | Section 2.2 edited to remove text, Truck III version and reference to NMI and NMO Evaluation certificates added..<br>Section 3.3 - Truck III software added<br>Section 5 operation text removed.<br>Photos updated, figures 6A, 6B, 6C added, figure typical arrangements updated.<br>Figure 18 PRT sealing added. |

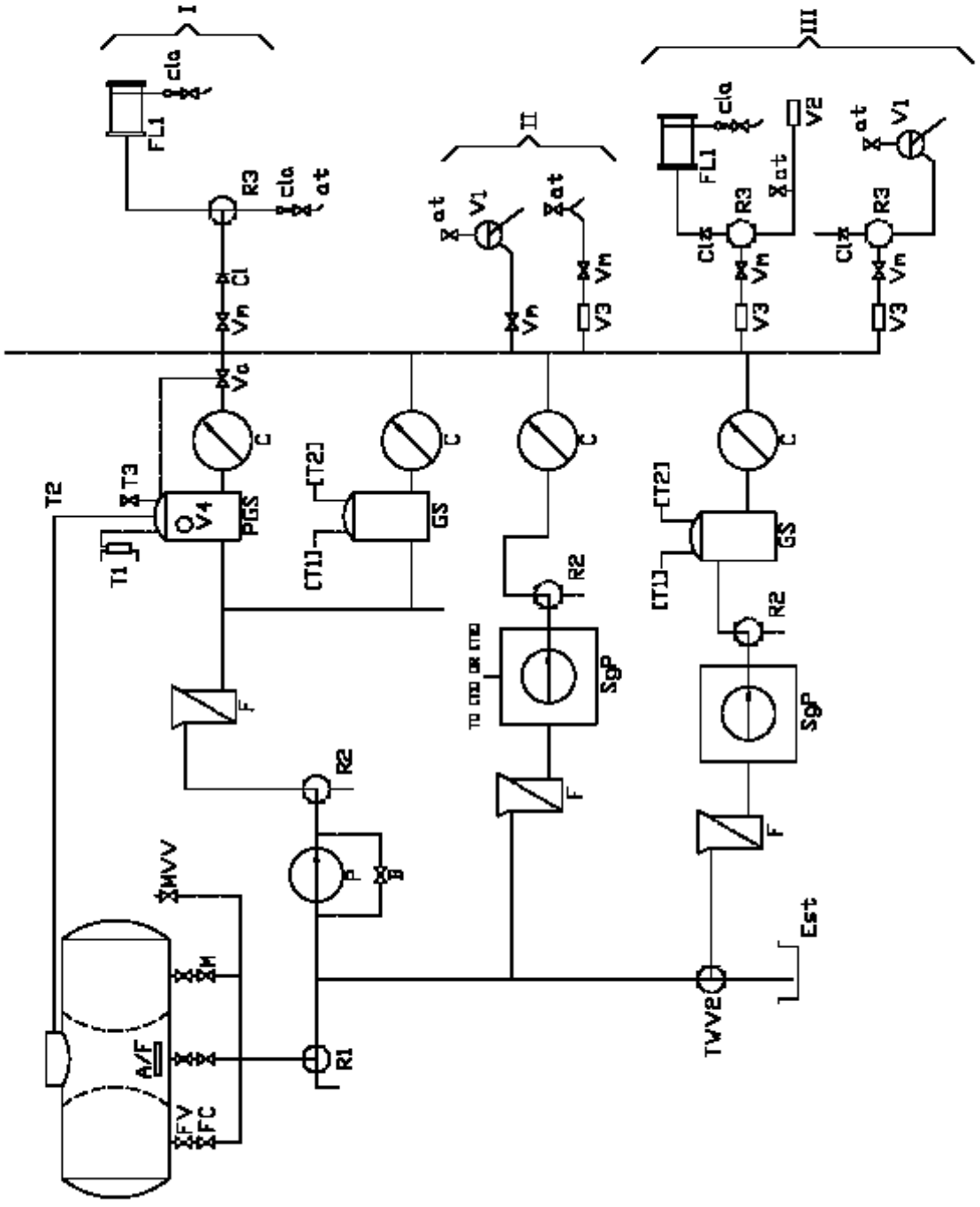



**Figure 1 Hydraulics schematic**

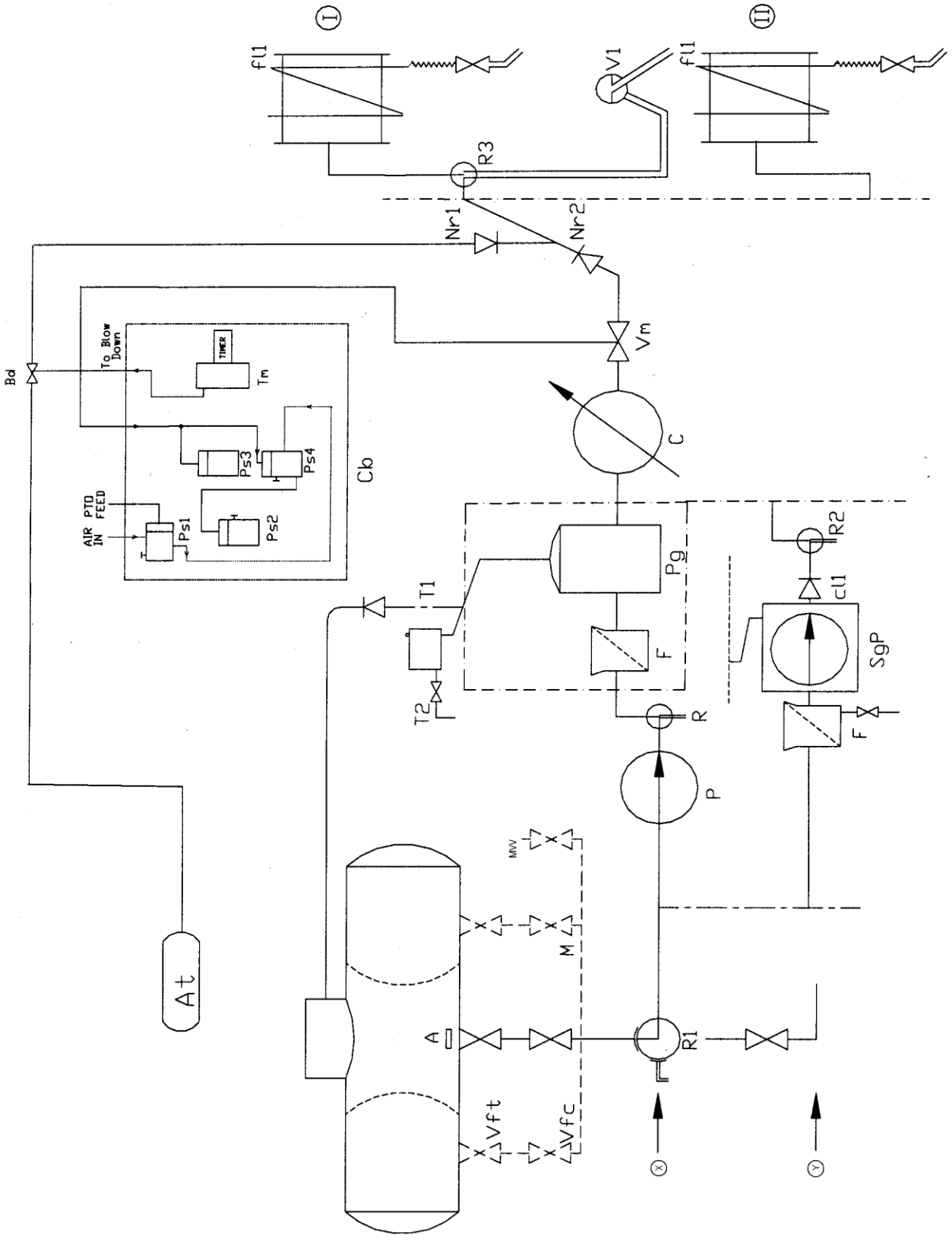



**Figure 2 Dry line system variants**

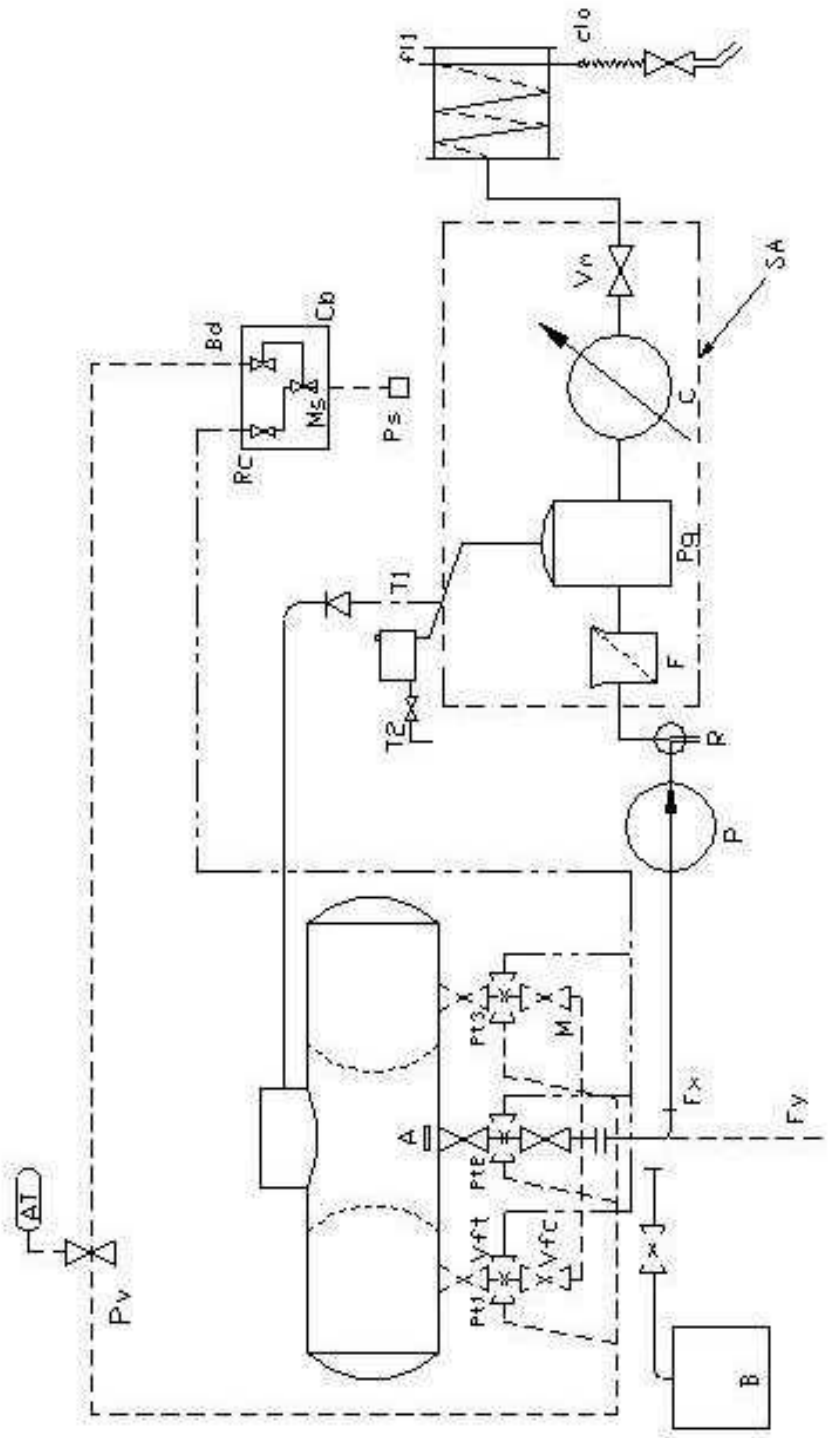



**Figure 3 Product return**

**Figure 4 TE550 electronic control system, CPU Module for cab mounting.**

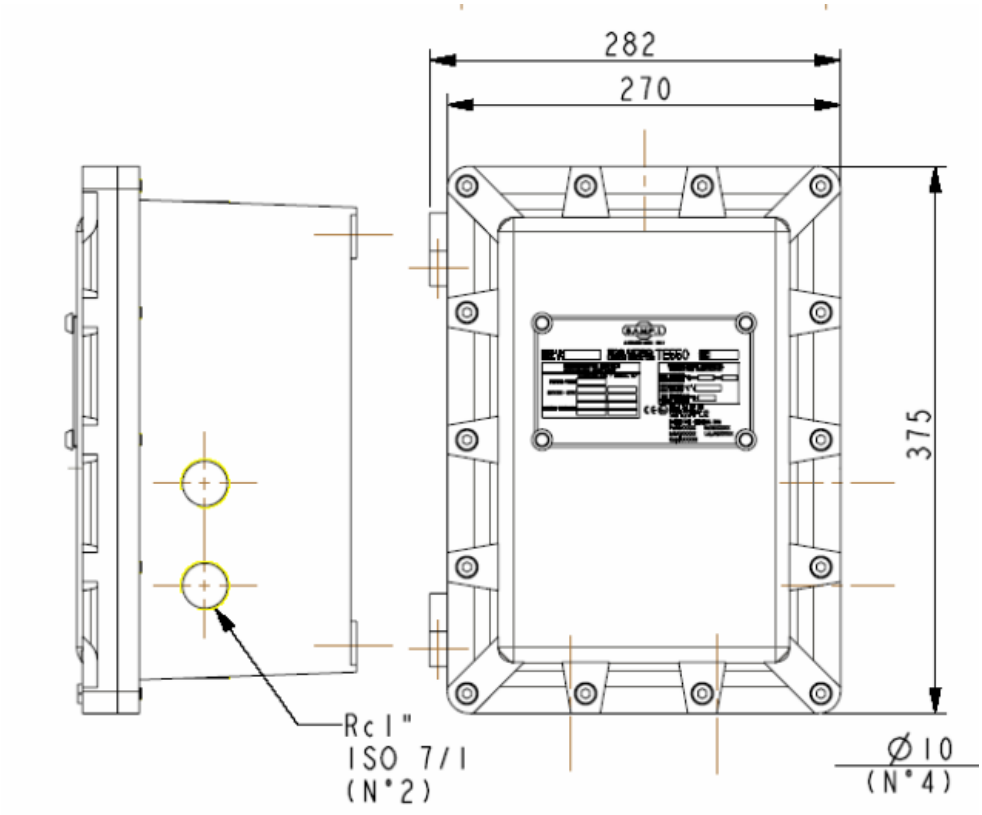
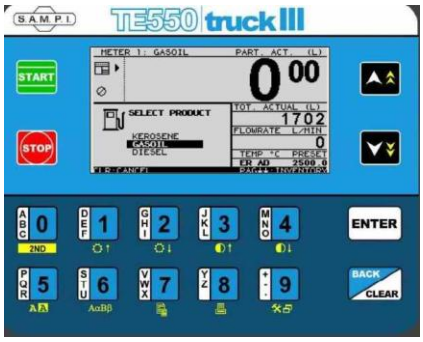



**Figure 5 Example of CPU module for external mounting**
**Wire sealed to prevent unauthorised opening**

WIRE SEALING POINTS

Fig 6 LKI stand alone display

Fig 6A LKI housed in CHECKMATE enclosure




6B TE550 Truck III LKI/TRK DISPLAY

Fig: 6C The CPU enclosure

**Figure 7 Pulse output device showing sealing**

**Figure 8 View showing TE550 unit fitted to tanker**

**Figure 9 2-way valve sealing**

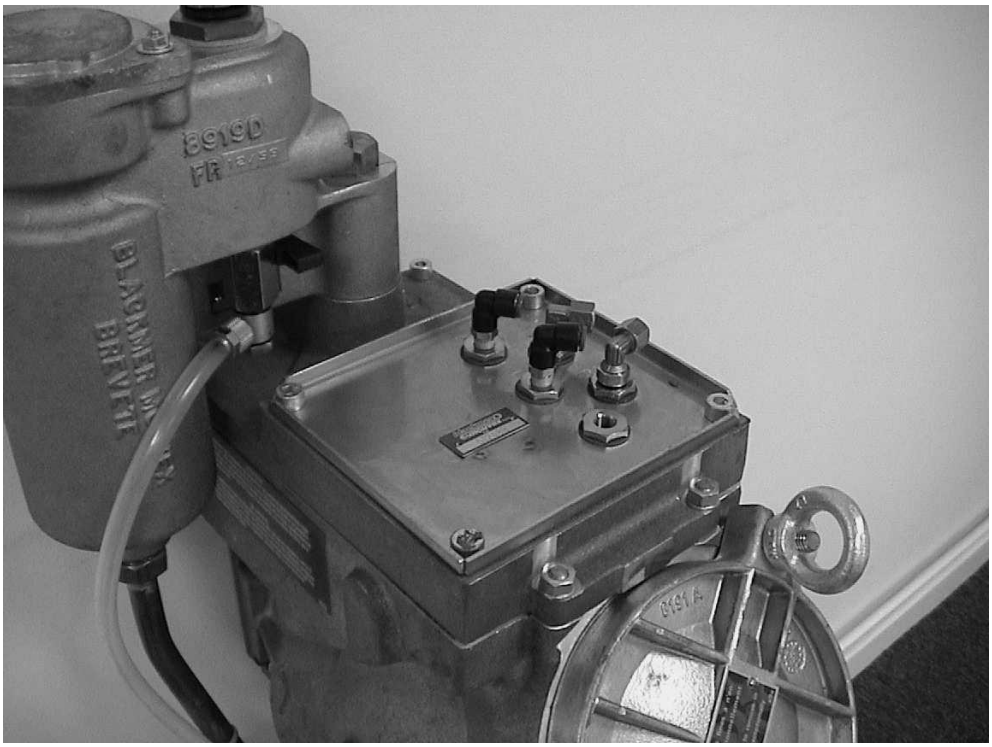


**Figure 10 Mouvex DMX gas separator**

**Figure 11 General view of product return system**

**Figure 12 Alternative LKI display panel enclosure**

**Figure 13 Alternative TE550 CPU enclosures**

**Figure 14 iMeter data monitoring device**

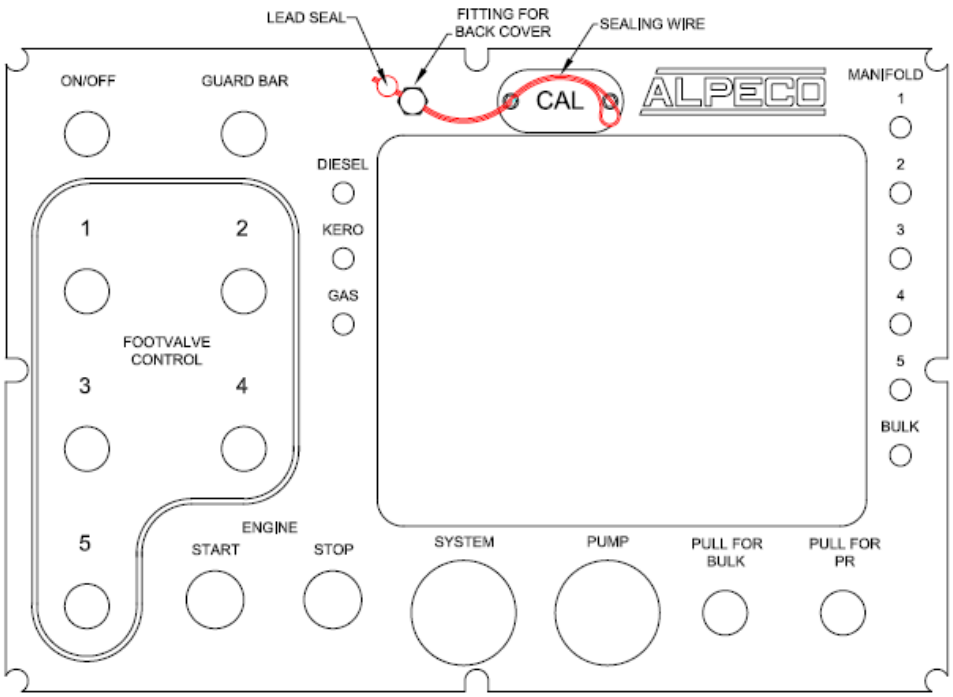



**Figure 15 Alternative sealing arrangement of the calibration switch for the alternative LKI enclosure**

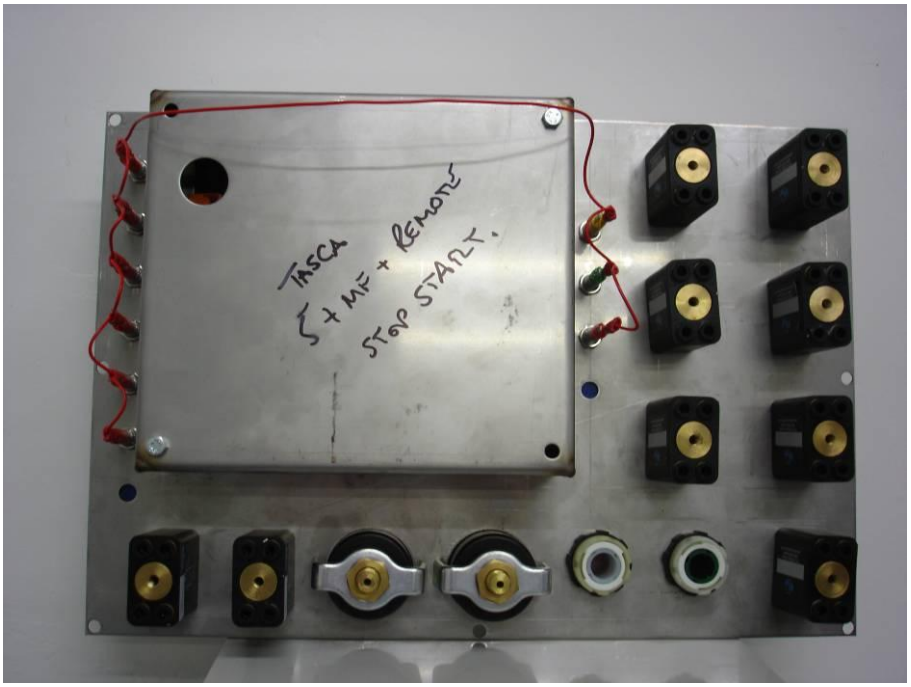



**Figure 16 Back cover for calibration switch and display for the alternative LKI enclosure**

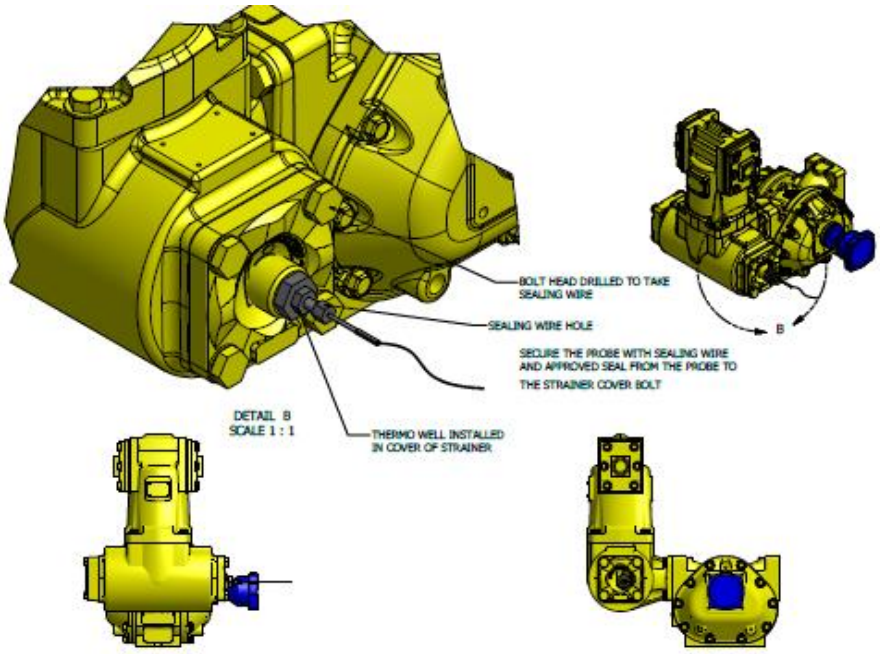
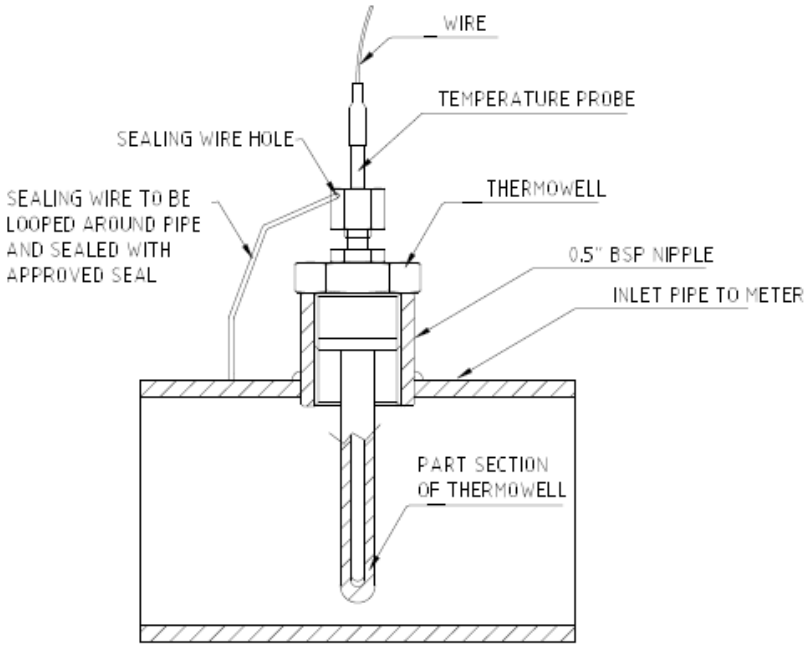

BOLT HEAD DRILLED TO TAKE SEALING WIRE
SEALING WIRE HOLE
SECURE THE PROBE WITH SEALING WIRE AND APPROVED SEAL FROM THE PROBE TO THE STRAINER COVER BOLT
B
DETAIL B
SCALE 1 : 1
THERMO WELL INSTALLED IN COVER OF STRAINER

**Figure 17 Thermowell Sealing**



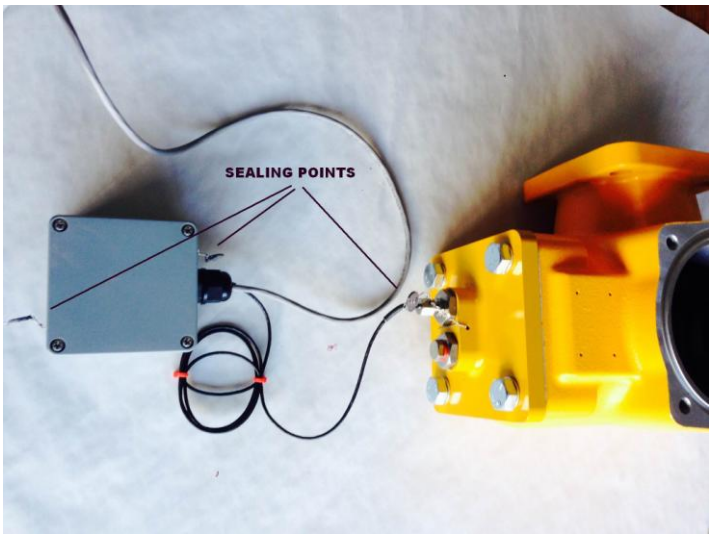



**Figure 18 PRT sealing**

**Figure 19 Alternative CPU Enclosure**

**Figure 20 LC Sound Sensor**

**Figure 21 LC Sound special gas extractor**